## Experimental Studies of Themocapillary Convection in Monotectic Liquid Alloys

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A process of decomposition of a melt being homogeneous at high temperature into two melts immiscible at lower temperatures is very rapid and prevents production of finely dispersed mixtures with the prospect of practical application [1]. Metal binaries exhibiting a limited mutual component solubility in the liquid state, the so-called "monotectic alloys" are of special technical importance as, for instance, electrical power switches or self-lubricated bearings and have become the subject of intensive studies during last years. Decomposition is caused by different processes like gravity-dependent sedimentation, Marangoni convection etc. and is not yet understood completely [2]. Owing to the difficulties of high-temperature experimentation and the absence of generally accepted measuring technique, thermodynamic properties of only a few monotectic binaries have been sufficiently studied experimentally. Electrical resistance of monotectic melts strongly depends on the state of phase separation. The gravity driven sedimentation leads to an arrangement of the lighter phase above the heavier one. Because resistance of both phases are different, the state of demixing can be determined by the overall melt resistance using the four-probe-method. Resistance of hypermonotectic Zn-Pb liquid alloys has been measured in a wide temperature range between 820°C and a monotectic line and its dependence on different parameters has been discussed. The results are compared with theoretical predictions. It was shown that the electrical resistance of the demixed melt changed if transport processes (Marangoni convection) took place under microgravity conditions. The measuring arrangement used in the microgravity experiment on Zn-Pb melts during the flight of TEXUS 39 is presented.

[1] L. Ratke, S. Diefenbach, Mat. Sci. Eng. R15 (1995) 261.
[2] D. Langbein. The Separation of Binary Alloys with Miscibility Gap in the Melt, in: J. N. Koster, R. L. Sani (Eds.), Low-Gravity Fluid Dynamics and Transport Phenomena, Progr. Astronautics Aeronautics, vol 130, AIAA, Washington, 1990.